11/21/16 "The things which hurt, instruct" -Benjamin Franklin

HW: "The Discriminant" w/s #3, 7, 10, 12, 13, 15
Test 1 on Thursday 12/1

AIM: What is the Discriminant?

Warm Up:

On the worksheet

1. $y = x^2 - 6x + 9$

$a = 1$
$b = -6$
$c = 9$

$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(9)}}{2(1)} = \frac{6 \pm \sqrt{0}}{2} = \frac{6 \pm 0}{2}$

$x = 3$

$\frac{6+0}{2} = 3 \quad \frac{6-0}{2} = 3$

b) 

c) c) Real / Rational / Equal

2. $y = x^2 - 2x - 24$

$a = 1$
$b = -2$
$c = -24$

$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-24)}}{2(1)} = \frac{2 \pm \sqrt{100}}{2} = \frac{2 \pm 10}{2}$

$\frac{2+10}{2} = 6 \quad \frac{2-10}{2} = -4$

$x = -4, 6$

b) 

c) a) Real Rational Unequal

3. $y = x^2 + 4x + 1$

$a = 1$
$b = 4$
$c = 1$

$x = \frac{-4 \pm \sqrt{(4)^2 - 4(1)(1)}}{2(1)} = \frac{-4 \pm \sqrt{12}}{2} = \frac{-4 \pm 2\sqrt{3}}{2} = -2 \pm \sqrt{3}$

$x = -2 + \sqrt{3}$
$x = -2 - \sqrt{3}$

b) 

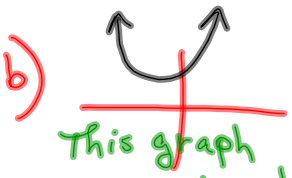
c) d) Real, Irrational, and unequal

4. $y = x^2 + 2x + 6$

$a = 1$
$b = 2$
$c = 6$

$x = \frac{-2 \pm \sqrt{(2)^2 - 4(1)(6)}}{2(1)} = \frac{-2 \pm \sqrt{-20}}{2} = \frac{-2 \pm 2i\sqrt{5}}{2} = -1 \pm i\sqrt{5}$

$x = -1 + i\sqrt{5}$
$x = -1 - i\sqrt{5}$

b) 

c) b) Imaginary

$\sqrt{20}$
$\sqrt{4}\sqrt{5}$
$2\sqrt{5}$

$b^2 - 4ac$ is called the discriminant, d, of the equation. You can determine the nature of the roots from the discriminant.

Value of discriminant	Description of roots	Description of graph (include number of x intercepts)
$d = 0$	Real, Rational, Equal	1 x-int.
$d > 0$ and a perfect square	Real, Rational, Unequal	2 x-int.
$d > 0$ and not a perfect square	Real, Irrational, Unequal	2 x-int.
$d < 0$	Imaginary	0 x-int.

When the discriminant > 0, the equation has 2 real solutions.

When the discriminant < 0, the equation has 0 real solutions.

When the discriminant = 0, the equation has 1 real solutions.

b^2-4ac find your a, b, c's

In 1-10, find the value of the discriminant and describe the nature of the roots.

1. $x^2-4x+8=0$

$a=1$
$b=-4$
$c=8$

$(-4)^2-4(1)(8)$
$16-32$
-16

Imaginary roots

2. $x^2-15x+36=0$

$a=1$
$b=-15$
$c=36$

$(-15)^2-4(1)(36)$
$225-144$
81

Real, Rational, Unequal Roots

4. $\frac{1}{4}x^2-6x+36=0$

6. $x^2+\sqrt{12}x+3=0$

8. $\frac{3}{x}-4=x$

$\times x \quad \times x$

$3-4x=x^2$
$-3+4x \quad +4x-3$
$0=x^2+4x-3$

$a=1$
$b=4$
$c=-3$

$(4)^2-4(1)(-3)$
$16+12$
28

Real, Irrational

11. Which parabola touches the x- axis at one point?

(1) $y=x^2+8x+16$ (2) $y=x^2-5x+6$

(3) $y=x^2-16$ (4) $y=x^2+4$

14. Given the equation $ax^2+bx+c=0$. If $b^2<4ac$, then the roots of the equation must be

(1) real and irrational (2) real and rational
(3) equal (4) imaginary

16. Find the largest integral value of c for which the roots of $2x^2-8x+c=0$ are real.

$a=2 \quad b=-8 \quad c=c$

discriminant is positive

$(-8)^2-4(2)(c)>0$

$64-8c>0$

$-64 \qquad -64$

$\frac{-8c}{-8} > \frac{-64}{-8}$

$c<8$

$c=7$